

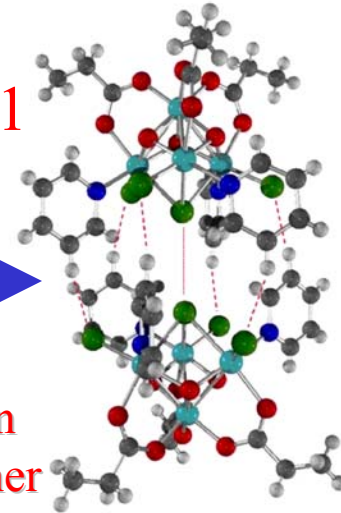
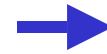
CAREER: Magnetic Resonance - From Materials Research to Science Education

Stephen Hill, University of Florida, DMR-0239481

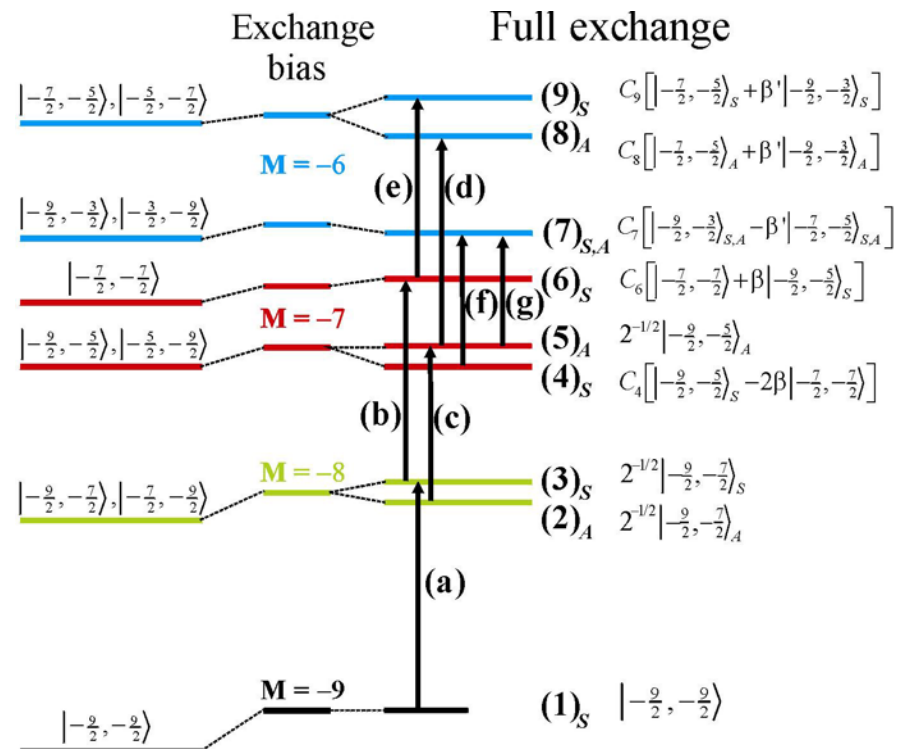
Recent research has focused on finding building blocks with which to construct the quantum logic gates (qubits) for a quantum computer. We have demonstrated that single-molecule magnets may be assembled to form coupled quantum systems of dimers with many of the attributes of quantum-dot-based schemes, representing a step forward in the drive towards applications involving molecular magnets. The supramolecular (or "bottom-up") approach to materials design is particularly attractive, as it affords control over many key parameters required for a qubit.

To appear in *Science* (Nov. 7th, 2003)

A dimer of single-molecule magnets



Quantum transitions between the coupled states of the dimer



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Education and training:

- One local high school student: Erica Bolin.
- Four undergraduate students: Daniel Phalen (summer REU student from Rice University); Sara Maccagnano (former REU student from Montana State University); Shaella Jones (UF); Daniel Benjamin (UF).
- Three UF graduate students: Susumu Takahashi; Jon Lawrence; Andrew Browne.
- Two postdocs: Rachel Edwards and Konstantin Petukhov.



2002 picture of research group

Education highlights:

- Undergraduate Sara Maccagnano received a Goldwater fellowship and was accepted to the graduate program at Cornell.
- High school student Erica Bolin won a regional science fair competition based on a poster presentation of her research.

Broader scientific impact

- Development of unique instrumentation for use at the National High Magnetic Field Laboratory (NHMFL).
- Proposal development for new instrumentation at the NHMFL.

A rotating microwave cavity for use in the 45 tesla high field magnets

